

REMARKS

Claims 12, 13, 15-18, 20-23, 25, 27, 28 and 30 are pending. By this Amendment, claim 12 is amended to clarify the features recited. Support for the amendment of claim 12 can be found in Applicants' specification, for example, at page 15, lines 8-9. No new matter is added by the Amendment. Reconsideration of the application based on the above amendment and following remarks is respectfully requested.

Claims 12, 13, 15-18, 20-23, 25, 27, 28 and 30 are rejected under 35 U.S.C. §103(a) over De Doncker (U.S. Patent No. 5,373,195) in view of Collier-Hallman (U.S. Patent No. 7,190,135), hereafter "Collier". The rejection is respectfully traversed.

De Doncker in view of Collier would not have rendered obvious said predetermined voltage is a minimum voltage that can secure the dead time of said voltage converter and is determined based on the dead time, the power supply voltage and a control period length, as recited in claim 12; and said predetermined voltage is a product of the power supply voltage and a control period length, divided by an effective control period length, the effective control period length being determined by subtracting the dead time from the control period length as recited in claims 13 and 15. De Doncker in view of Collier also would not have rendered obvious said maximum effective on-duty is determined by dividing an effective control period, calculated by subtracting said dead time from said control period, by said control period, as recited in claim 17 and similarly recited in claim 22.

Regarding claim 12, the Office Action alleges that it would have been obvious to one of ordinary skill in the art to remove the influence of the dead time as disclosed by De Doncker when a command value is within a particular range. The Office Action further alleges that it would have been obvious to control De Doncker with the Collier controller to obtain the features recited in claim 12. The Office Action analysis fails for at least the following reasons.

Collier addresses only controlling signal linearization for an electric motor, and does not address the features recited in the controller of claim 12. Collier is directed at solving problems associated with a control signal linearization. Collier's controller does not address controlling a switching duty as recited in claim 12. Collier indicates that the method of controlling is carried out when the command value is between a first good operating point, which is defined as a point where the motor exhibits an acceptable torque ripple and linearity, and a second good operating point, which is defined as a point at a zero command, at which point the inverter produces very low torque ripple. For command values greater than zero but less than the first good operating point, a time-based modulation is implemented where the command is modulated to a threshold value for a period of time proportional to the relationship between the actual desired value and the threshold value. *See* Collier, col. 3, lines 1-21. That is, Collier's controller does not address controlling a switching duty as recited in claim 12.

Furthermore, Collier's first good operating point and second good operating point cannot reasonably be interpreted to correspond to said predetermined voltage...determined based on the dead time, the power supply voltage and a control period length, as recited in claim 12, because the first good operating point and second good operating point are defined as explained above.

In rejecting claims 13, 15, 17 and 22 the Office Action does not cite any support for the very specific equations by which the predetermined voltage is calculated, or the on-duty is determined, as recited in the claims.

Regarding claims 13, 15 and 17, the Office Action alleges Collier discloses the claimed predetermined voltage recited in claims 13 and 15, and the claimed on-duty ratio recited in claim 17. *See* Office Action, page 4, line 16 - page 5, line 12. At the portion of Collier cited by the Office Action, col. 3, line 9, Collier discloses that the first good operating

point is a threshold voltage. Collier does not disclose how this first operating point is determined beyond that it is a point where the motor exhibits acceptable torque ripple and linearity above this threshold. That is, Collier cannot reasonably be interpreted to disclose a feature that corresponds to the predetermined voltage equation positively recited in claims 13 and 15, or the on-duty equation positively recited in claim 17.

In rejecting claim 22, the Office Action alleges that the claimed maximum effective on-duty corresponds to Collier's first good operating point, and the claimed longest on-duty corresponds to Collier's second good operating point. Applicants disagree for at least the reasons explained above regarding claims 13, 15 and 17. Collier does not disclose how this first operating point is determined beyond that it is a point where the motor exhibits acceptable torque ripple and linearity.

Further, the Office Action alleges that the recited on-duty feature would have been rendered obvious by Collier because the use of an equation would have been an obvious design choice. Applicants respectfully disagree. Collier discloses that the effects of the unacceptable torque ripple and linearity are removed by modulating the command value to be the threshold value. The Office Action alleges that this modulation corresponds to the claimed on-duty recited in claim 22. Applicants disagree with this assertion for reasons similar to those explained regarding claim 17.

The Office Action further alleges that the on-duty feature recited in claim 22 would have been an obvious design choice, and that this feature presents no novel or unexpected results. Applicants respectfully disagree. The on-duty recited in claim 22 has the results of elimination of dead time. Thus, De Doncker in view of Collier would not have rendered obvious the combinations of features recited in claims 12, 13, 15, 17 and 22. Accordingly, De Doncker in view of Collier also would not have rendered obvious the combinations of features recited in claims 16, 18, 20, 21, 23, 25, 27, 28 and 30 for at least the dependence of

these claims on claims 12, 13, 17 and 22 and for the separately patentable features that these claims recite. Withdrawal of the rejection is respectfully requested.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 12, 13, 15-18, 20-23, 25, 27, 28 and 30 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



James A. Oliff
Registration No. 27,075

Robert G. Bachner
Registration No. 60,122

JAO:RGB/mkg

Date: June 21, 2010

OLIFF & BERRIDGE, PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE
AUTHORIZATION
Please grant any extension
necessary for entry of this filing;
Charge any fee due to our
Deposit Account No. 15-0461